

FISHES OF THE LITTORAL ZONE, PINELLAS COUNTY, FLORIDA¹

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ABSTRACT: *Fishes along the beaches of Pinellas County, Florida, were sampled by beach seine during 1970 and 1971. A total of 228,667 individuals representing 30 families and 62 species was collected. Individuals were most abundant in April and September and least abundant in January and February. Several species were more numerous in July through September than in the remaining months. Species diversities fluctuated throughout the year. Ten species (Harengula jaguana, Anchoa hepsetus, A. mitchilli, Menidia beryllina, Menticirrhus littoralis, Opisthonema oglinum, Menticirrhus focaliger, Trachinotus carolinus, T. falcatus, and A. cubana) comprised 97.7% of the total number of individuals. The fishes were relatively small; most individuals were less than 100 mm total length.**

THE littoral zone of the Gulf of Mexico off Pinellas County, Florida, was studied to provide background data on the fauna and habitat before beach restoration (Saloman, 1974). This report on the fishes is part of that study.

Previous studies of fishes inhabiting waters along the beach of Pinellas County include those of Springer and Woodburn (1960) and Finucane (1969), who each sampled one station on Long Key with a beach seine, and that of Fable and Saloman (1974), who surveyed the recreational fishery on 3 piers on Sand Key, Florida. Studies of fishes of the sandy beaches of the Gulf of Mexico in general are uncommon. Gunter (1945 and 1958), Reid (1956), and MacFarland (1963) reported on shore fishes in Texas; Gunter and Hall (1965) at Sanibel Island, Florida; Holland, Chambers, and Blackman (1973) at Lido Key, Florida; and Naughton and Saloman (1978) at Panama City, Florida.

STUDY AREA—The study area includes the gulf beaches of 3 barrier islands (Long Key, Treasure Island, and Sand Key) on the central west coast of Florida (Fig. 1). Three passes separate the islands and connect the Gulf of Mexico to either Boca Ciega Bay or to the intracoastal waterway. The 3 islands are long and narrow, ranging from 25.7 km (Sand Key) to 6.5 km (Treasure Island) in length. Elevations do not exceed 3 m (U.S. Secretary of the Army, 1966). The bayward side of the 3 islands is almost entirely lined with seawalls and has numerous fingers of filled land for residential use. The gulf side of Sand Key has numerous groins and fishing piers. The northern end of Treasure Island also has several groins plus an emergent sandbar created by a spoil from maintenance dredging

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of Johns Pass. No groins are found on Long Key, but a small jetty is located at Blind Pass.

The water depth along most of the coastline increases to at least 1.8 m and decreases over a sandbar to about 0.9 m within 30.5 m offshore. At the northern end of Sand Key, the slope of the bottom is more gradual than the southern portion of the study area. Submerged rooted vegetation is absent. A more detailed description of the beach and offshore area is given by Saloman (1974).

The surface sediments of the nearshore zone along the beach consisted mainly of white sand, shells, and shell fragments (Saloman, 1974). The average mean grain size was 0.9 phi. The shells and shell fragments caused the mean grain size to be fairly large, as the percentage of carbonate averaged 43.6% and ranged from 12-69%. The average weight percent of sand was 78.4 and organic matter 17.3.

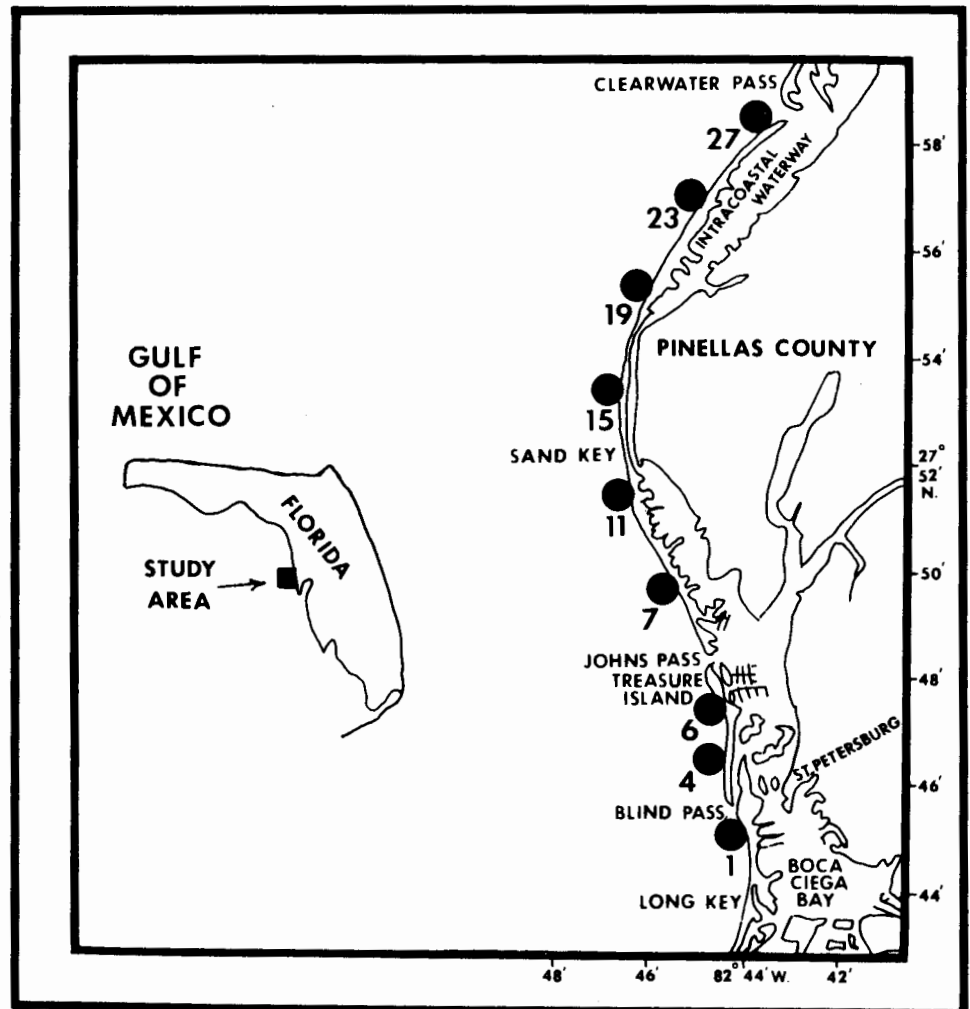


FIG. 1. Locations of beach seine stations.

Nine stations were located at 0.93 km apart, from the northern end of Long Key to the northern end of Sand Key (Fig. 1).

MATERIALS AND METHODS—Fishes were collected monthly from December 1970 through November 1971 with a 30.5×1.8 m beach seine made of 0.64 cm bar-mesh nylon netting. At each station, the seine was set perpendicular to the shore and pulled in an arc toward shore. Two sets were made at each station, with the net pulled in opposite directions in the 2 sets.

Specimens were preserved in a 10% Formalin-seawater solution and later identified to species and enumerated. Total length, to the nearest mm, was recorded on all individuals of each species, when sample size was less than 50, or a random subsample of 50 individuals of each species, when sample size was greater than 50.

A water sample for salinity and turbidity was taken at each station. Salinity was measured in the laboratory with a Goldberg refractometer; turbidity was measured with a Hach turbidimeter. Water temperature was measured in the field with a mercury thermometer.

The Shannon Index of general diversity (\bar{H}) where $\bar{H} = -\sum \frac{(n_i)}{N} \log_e \frac{(n_i)}{N}$ with

n_i as the number of individuals of a given species and N as the total number of individuals was calculated for each station and each month (Odum, 1971).

HYDROLOGY—Water temperature, salinity, and turbidity varied seasonally; temperature and salinity exhibited a narrow range of variability during any particular month. Water temperatures averaged 23.0°C and ranged from 14.7 – 30.0°C . Salinities averaged 34.0‰ and ranged from 30.9–35.7‰. Turbidities averaged 10.9 J TU (Jackson Turbidity Unit) and ranged from 2.8–31.0 J TU (Table 1).

SEASONALITY OF CATCH—A total of 228,667 individuals representing 62 species and 30 families was caught during the sampling period of December 1970 through November 1971 (Tables 2 and 3). A single large catch of 40,776 *Anchoa hepsetus* at Station 15 in April 1971, accounted for 17.8% of the total catch for the entire survey. This catch tended to bias the data in regards to season, station, and species abundance.

The number of individuals varied by season. The winter months (December–February) accounted for 2.5% of the catch; spring (March–May) 25.0%; summer (June–August) 23.6%; fall (September–November) 48.9% (Table 2). If the single catch of *A. hepsetus* at Station 15 in April were deleted from the catch during spring, the percentage of catch for spring would decrease from 25.0–8.8%. The number of species was highest during July–September and lowest in December (Table 2).

The general index of species diversity (\bar{H}) varied monthly. The lowest monthly diversity was in March and the highest was in July (Table 2).

CATCH BY STATION—The number of individuals per station for the 12-mo sampling period varied from a low of 10,990 at Station 11 to a high of 65,799 at Station 15 (Fig. 2). If the large catch of *A. hepsetus* at Station 15 in April 1971

TABLE 2. Most abundant fishes caught with a beach seine at stations on the gulf shores of Pinellas County, Florida, December 1970–November 1971.

	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Total
													Number
													%
<i>Harengula jaguana</i>	304	165	12	40	1,382	274	2,113	27,296	12,039	47,081	8,161	17,064	115,931
<i>Anchoa hepsetus</i>	10	4	29	59	41,736	1	208	92	9	7,727	3	28	49,897
<i>Anchoa mitchilli</i>	2,382	201	1,366	6,164	4,756	0	0	0	130	1,768	38	4	16,809
<i>Menidia beryllina</i>	39	4	5	17	85	1,898	382	145	108	8,624	826	176	12,309
<i>Menticirrhus littoralis</i>	321	176	33	50	4	13	411	1,583	2,209	4,999	999	521	11,329
<i>Opisthonema oglinum</i>	0	0	0	0	0	3	25	13	63	43	27	10,129	10,303
<i>Menticirrhus focaliger</i>	0	3	1	11	25	189	1,386	1,248	0	108	21	28	3,020
<i>Trachinotus carolinus</i>	4	0	1	3	0	6	584	283	56	266	216	74	1,483
<i>Trachinotus falcatus</i>	23	16	2	3	12	14	2	0	119	877	194	107	1,369
<i>Anchoa cubana</i>	255	95	0	3	3	0	0	0	991	0	0	0	1,347
<i>Oligoplites saurus</i>	6	1	0	0	1	8	16	8	132	755	148	214	1,289
<i>Menticirrhus americanus</i>	0	0	0	0	0	0	517	363	0	0	0	0	880
<i>Strongylura marina</i>	11	5	0	10	44	14	267	184	71	66	3	1	676
<i>Mytil trichodon</i>	0	0	2	99	8	11	31	138	98	47	45	18	507
<i>Eucinostomus gula</i>	7	1	0	0	0	0	0	0	339	113	0	6	466
<i>Hyporhamphus unifasciatus</i>	1	0	0	0	2	162	39	0	0	0	0	2	206
<i>Chloroscombrus cyrusurus</i>	0	0	0	0	0	0	2	3	5	182	3	0	195
<i>Caranx chrysos</i>	0	0	0	0	1	0	0	7	119	0	0	0	127
No. of Species ¹	15	25	18	20	21	19	25	28	27	28	23	22	
Total individuals ¹	3,388	725	1,507	6,498	48,110	2,623	6,015	31,423	16,513	72,733	10,719	28,413	228,667
(H) for each month ¹	1.080	1.869	0.500	0.315	0.490	1.490	0.614	1.897	1.043	1.227	0.938	0.886	100.0

¹ Computations include those species listed in Table 3.

TABLE 3. Fishes comprising less than 0.1% of the catch caught by beach seine on the gulf shores of Pinellas County, Florida, 1970-71.

Species	No.	Species	No.
<i>Lagodon rhomboides</i>	66	<i>Pomatomus saltatrix</i>	5
<i>Sardinella anchovia</i>	55	<i>Brevoortia patronus x smithi</i>	4
<i>Elops saurus</i>	52	<i>Paralichthys</i> sp.	4
<i>Caranx Hippo</i>	40	<i>Fundulus similis</i>	4
<i>Leiostomus xanthurus</i>	28	<i>Sphyræna guachancho</i>	4
<i>Brevoortia smithi</i>	26	<i>Lagocephalus laevigatus</i>	3
<i>Pogonias cromis</i>	25	<i>Chilomycterus schoepfi</i>	3
<i>Scomberomorus maculatus</i>	21	<i>Centropomus undecimalis</i>	3
<i>Archosargus probatocephalus</i>	20	<i>Cynoscion nebulosus</i>	3
<i>Eucinostomus argenteus</i>	17	<i>Chaetodipterus faber</i>	2
<i>Arius felis</i>	17	<i>Etropus crossotus</i>	1
<i>Sphyræna borealis</i>	13	<i>Urophycis floridanus</i>	1
<i>Paralichthys albigutta</i>	12	<i>Monacanthus hispidus</i>	1
<i>Cynoscion arenarius</i>	12	<i>Orthopristis chrysoptera</i>	1
<i>Astroscopus y-graecum</i>	10	<i>Decapterus</i> sp.	1
<i>Trachinotus goodei</i>	10	<i>Rhinoptera bonasus</i>	1
<i>Gymnura micrura</i>	9	<i>Aluterus schoepfi</i>	1
<i>Synodus foetens</i>	8	<i>Brevoortia patronus</i>	1
<i>Bairdiella chrysura</i>	7	<i>Floridichthys carpio</i>	1
<i>Sphæroides nephelus</i>	7	<i>Fundulus</i>	1
<i>Prionotus tribulus</i>	6	<i>Bagre marinus</i>	1
<i>Dasyatis sayi</i>	6	<i>Prionotus scitulus</i>	1

were deleted, Station 6 with 41,982 would rank first in total numbers of individuals, followed by Station 15.

The number of species varied from 28 at Station 27 to 37 at Station 6. Numbers of species were higher at the southern end of the study area (Stations 1, 4, and 6) than at the northern end (Stations 19, 23, and 27).

The general index of species diversity (\bar{H}) varied from station to station. The lowest diversity was at Station 15 (1.324) and the highest at Station 7 (2.987). Stations 1, 4, 6, 11, 19, 23, and 27 had values of 2.137, 2.503, 2.342, 2.921, 2.467, 2.310, and 1.928, respectively.

MOST ABUNDANT SPECIES—Ten species (*Harengula jaguana*, *Anchoa hepsetus*, *A. mitchilli*, *Menidia beryllina*, *Menticirrhus littoralis*, *Opisthonema oglinum*, *Menticirrhus focaliger*, *Trachinotus carolinus*, *T. falcatus*, and *A. cubana*) comprised 97.7% of the total number of individuals (Table 2). Three species, *H. jaguana*, *M. beryllina*, and *M. littoralis*, were present during all months; *H. jaguana* and *M. littoralis* were present at a majority of the stations during 11 of 12 mo. The remaining species were either absent during some months or their distributions were not as uniform along the beach as those of *H. jaguana* and *M. littoralis* (Table 4).

The seasonal mean and range of total lengths (mm) for the 10 dominant species are in Table 4. Most individuals of the 10 dominant species had mean lengths between 50 and 100 mm. The largest mean length (169 mm) occurred in the spring for *T. falcatus*; the smallest mean length (28 mm) occurred in the summer for *T. falcatus* (Table 5).

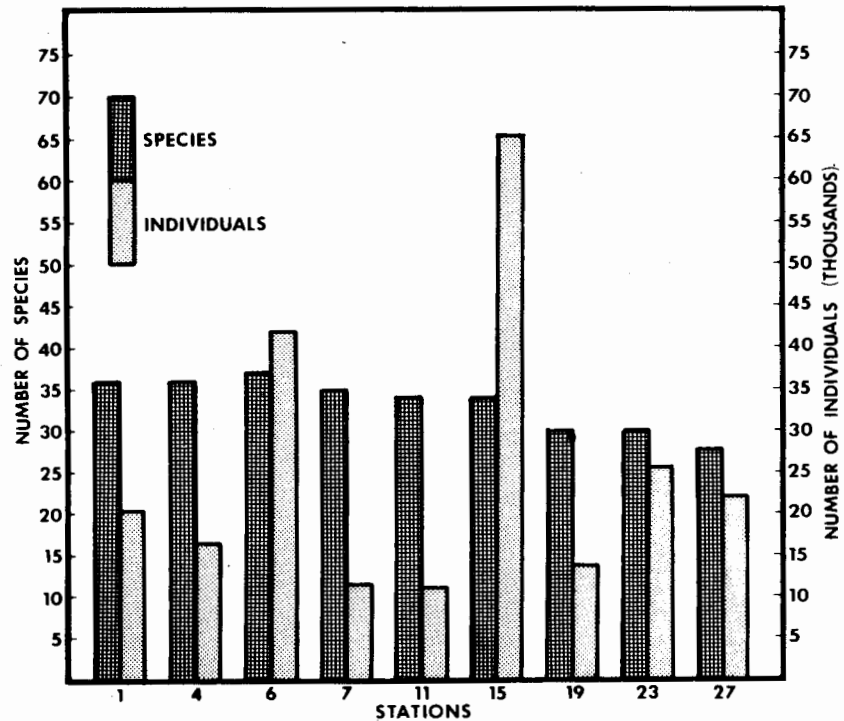


FIG. 2. Number of species and individuals of fish collected at beach seine stations on gulf shores of Pinellas County, Florida, December 1970-November 1971.

DISCUSSION—The composition of the dominant fishes within the fauna inhabiting the various beaches around the periphery of the Gulf of Mexico vary by locality. Some species, *H. jaguana*, *M. littoralis*, *M. beryllina*, and *A. mitchilli*, appear dominant in most of the reports of gulf beaches (Gunter 1945 and 1958; Springer and Woodburn, 1960; Gunter and Hall, 1965; MacFarland, 1963; Holland, Chambers, and Blackman, 1973; and Naughton and Saloman (1978). The difference in abundance and composition is probably due to several factors, such as the type of gear and method of collection. Also, each beach has its own characteristic slope, substrate composition, wave energy, currents, erosion or accretion of substrate, and water quality. Differences in abundance and composition exist even in areas located in close proximity to each other. On Long Key, Springer and Woodburn (1960) reported that 6 species were abundant at their single station sampled monthly for 14 consecutive mo, but only 3 of their species (i.e., *H. jaguana*, *M. littoralis*, and *T. falcatus*) were in the dominant 10 in our study. In a study of the fish fauna of Panama City Beach, Florida, Naughton and Saloman (unpublished MS) found that 4 of the 10 most abundant species (i.e., *H. jaguana*, *M. beryllina*, *M. littoralis*, and *T. carolinus*) were the same as the dominant species inhabiting waters along the beaches of Pinellas County using the same gear and methods.

The size of the fish caught along the beaches tends to be small, due to the

TABLE 4. The number of stations at which the 10 most abundant species occurred.

Species	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.
<i>Harengula jaguana</i>	6	5	5	7	7	2	8	9	9	8	9	9
<i>Anchoa hepsetus</i>	3	3	3	7	9	1	1	1	0	5	1	2
<i>Anchoa mitchilli</i>	6	8	7	7	9	0	0	0	4	1	2	1
<i>Menidia beryllina</i>	1	1	2	1	5	6	1	3	1	8	2	3
<i>Menticirrhus littoralis</i>	8	9	9	7	3	5	9	9	9	9	8	8
<i>Opisthonema oglinum</i>	0	0	0	0	0	2	4	5	2	6	6	9
<i>Menticirrhus focaliger</i>	0	2	1	4	6	9	9	8	0	5	4	2
<i>Trachinotus carolinus</i>	2	0	1	1	0	2	9	9	8	9	8	9
<i>Trachinotus falcatus</i>	4	1	1	1	1	1	1	0	8	8	8	8
<i>Anchoa cubana</i>	3	3	0	2	1	0	0	0	3	0	0	0

TABLE 5. Sizes (mm) of the 10 most abundant fishes caught by beach seine on gulf shores of Pinellas County, Florida, December 1970-November 1971.

Species	Winter (Dec.-Feb.)		Spring (Mar.-May)		Summer (June-Aug.)		Fall (Sept.-Nov.)	
	Mean	Range	Mean	Range	Mean	Range	Mean	Range
<i>Harengula jaguana</i>	74	43-132	87	58-188	73	17-166	62	30-100
<i>Anchoa hepsetus</i>	101	79-116	56	12-140	79	14-117	38	30-88
<i>Anchoa mitchilli</i>	51	27-70	54	37-70	35	18-56	40	27-80
<i>Menidia beryllina</i>	79	48-97	87	58-172	100	58-161	80	45-125
<i>Menticirrhus littoralis</i>	72	24-193	109	22-179	53	17-197	89	19-220
<i>Opisthonema oglinum</i>	0	0 ¹	94	80-119	94	52-180	65	37-105
<i>Menticirrhus focaliger</i>	67	47-93	56	21-114	67	18-164	56	20-115
<i>Trachinotus carolinus</i>	95	59-135	82	42-166	43	12-250	73	12-185
<i>Trachinotus falcatus</i>	121	49-204	169	110-196	28	12-62	83	15-183
<i>Anchoa cubana</i>	44	34-62	51	33-71	52	28-57	0	0 ¹

¹Not present.

mesh size of the gear and net avoidance by larger fishes. Most individuals were below 100 mm total length. Similar findings were also noted for the most abundant species inhabiting the waters along other beaches (Gunter 1945 and 1958; Reid 1956; Springer and Woodburn, 1960; Gunter and Hall, 1965; and Naughton and Saloman (1978).

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